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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/513,207	02/24/2000	Jian Li	7468.0002	6210
22852	7590	03/23/2004		
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 1300 I STREET, NW WASHINGTON, DC 20005				
			EXAMINER SODERQUIST, ARLEN	
			ART UNIT 1743	PAPER NUMBER

DATE MAILED: 03/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/513,207	LI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Arlen Soderquist	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6,8-12 and 14-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9 and 10 is/are allowed.
- 6) ☒ Claim(s) 1-6,8,11,12 and 14-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

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1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 21, 2004 has been entered.
2. Claims 2, 12, and 23-24 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In claims 2 and 12 examiner is interpreting the term probe to be any kind of UV-ATR device. Also the device is inherently an optical device due to the "UV" part of the name. Examiner would point to claim 17 as a way to incorporate additional language that will cause claims 2 and 12 to become further limiting. In claims 23-24 the kraft liquor stream or liquid kraft pulp stream is at some point undiluted and the claims do not distinguish where that point is nor would that constitute a proper further limitation of the structure.
3. Claims 11-12, 14 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 11-12 and 14 there is no structural connection between the liquid kraft pulp stream source and the rest of the elements of the system. In claim 24, "the kraft liquor stream" does not have proper antecedent basis.
4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

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3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 1-2, 4-6, 8, 11-12 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danielsson in view of Karlberg (US 5,641,966) and Ley. In the paper Danielsson discusses UV-Vis spectroscopic measurements in opaque solutions: process liquors in the paper and pulp industries. Initial attempts at using an attenuated total reflection probe for measurements in process liquors of the kraft pulp and paper industries are discussed. In white liquor, sulfides and polysulfides were the only species giving appreciable absorption. The probe could be used for sulfide concentrations 1 M. The range of applicability was influenced by the total solute concentration through its effect on the refractive index of the solution. The absorption was related to concentration in a non-traditional way, but this was largely overcome by the use of multivariate calibration methods. The black liquor resulting from the cook contained large amounts of highly absorbing organic compounds, especially lignin. Using synthetic solutions, a successful calibration model for sulfides, lignin, and total solute content was constructed. Before long-time use of the probe in highly alkaline media can be recommended, a protection for the end mirror must be included. Relative to the wavelength capabilities the spectra of figure 5 have a range of 190 nm – 380 nm, covering the claimed range. Danielsson does not show absorption data that goes below about 210 nm.

In the patent Karberg teaches a process and device for measuring chemical and physical parameters for characterizing and classifying aqueous suspensions. The invention relates to a method of determining physical and/or chemical properties in water samples containing suspended substances and/or particles, the physical and/or chemical properties being singly or jointly determined as amount of nitrate, iron, ammonium, phosphate, total nitrogen or total phosphorous; turbidity, chemical oxygen demand (COD) and/or biological oxygen demand (BOD). Column 6, line 36 to column 7, line 2 teaches some detail of the invention including a frequency range of 190-820 nm (lines 53-57). The method according to the invention is detailed for discrete and manually collected water samples, but the method is not limited to samples collected in this way and a continuous in situ measurement can also be used. The optical measurement can suitably be performed by means of fiber optics. The light source and light

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detector are located at a distance from the object to be measured, while the measuring cell is placed in the water sample. The measuring device receives the light from the light source by way of one or more optical fibers. Light not absorbed by the sample is by means of the same principle returned to the light detector. Absorbance data for calibration are recorded for samples having known amounts of or measured values for nitrate, ammonium, orthophosphate, total nitrogen, total phosphorous, iron, COD, turbidity etc. within the wavelength area of 190-820 nm in steps of 2 nm. Air or distilled water can be used as reference. The number of samples used like this for calibration should preferably exceed 100 and the samples must be typical for the condition to be studied. The samples are preferably selected in such a way that too many samples having an almost identical composition are avoided. Absorbance data for sample measurement are collected on unfiltered samples (air or water as reference) from several waste water purifying plants, whereby processing according to any of the models PLS, PCR or neural networks is made.

In the paper Ley presents ultra-violet absorption spectrum of hydroxyl ion. The absorption spectra of solutions of NaOH in water varying from 0.063 to 0.066 N, of Ba(OH)<sub>2</sub> solutions from 0.0034 to 0.0528 N and of Ca(OH)<sub>2</sub> at 0.0398 N have been determined. In all cases a maximum was observed at 186 nm; this must be characteristic of OH<sup>-</sup> ion. A brief theoretical discussion is given.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the detection wavelengths of Karlberg into the Danielsson device and method because of the known absorption frequency for hydroxide ion as taught by Ley because of the ability to use the absorption spectra in the regression calculations.

6. Claims 3, 14-15 and 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danielsson in view of Karlberg and Ley as applied to claims 1, 11 and 16 above, and further in view of Doyle. Danielsson does not teach using an ATR tunnel flow cell in the method or device.

In the paper Doyle discusses the analysis of strongly absorbing chromophores by UV/visible ATR spectroscopy. This article illustrates the potential of the attenuated total reflectance (ATR) sampling technique for UV/visible analysis and explores ways in which this

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potential can be maximized. Although UV/visible ATR is far from new, it was largely neglected, perhaps because of the limited range of operating conditions used in previous work. By the appropriate choice of ATR optical design and operating parameters the authors were able to maximize the sensitivity of the technique for diverse sample conditions. The design they developed was a tunnel flow cell shown in figure 4. The advantage of this system is that it eliminates the restriction of angle of incidence, allowing the use of materials such as fused silica (page 50). The device of figure 4 also does not need a mirror to function. Figure 8 shows spectra accumulated over the claimed region for the silica ATR element. The authors also observed artifacts at high concentrations of some analytes, which are a result of refractive index dispersion resulting from strong electronic transitions in the vacuum UV region. Of particular interest is the potential for using small amounts of solvent to shift the frequencies of these artifacts so as to optimize the analysis of minor constituents.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the ATR element configuration of Danielsson with the tunnel flow cell configuration of Doyle because of its advantages taught by Doyle such as optimizing the system for maximum sensitivity and elimination of a restriction on the angle of incidence or for a recognition that the mirror problem of Danielsson would not be present in the tunnel flow cell configuration.

7. Claims 9-10 are allowed. The art of record fails to teach or fairly suggest a method as claimed in which the concentrations of sodium hydroxide, sodium sulfide and sodium carbonate can be simultaneously and separately (independently) determined in a kraft liquor stream from the spectrum of the stream with wavelengths in the range of 190 to 300 nm. This is to be distinguished from being able to determine hydroxide ion, sulfide ion and carbonate ion in a kraft liquor stream.

8. Applicant's arguments filed November 24, 2003 and January 21, 2004 have been fully considered but they are not persuasive. Relative to the probe of claims 2 and 12 not being a further limitation of claims 1 and 11 examiner points to claims 17-18 as containing language that provides a further structural limitation. This is because examiner is interpreting the probe language as covering both the device that is placed in a kraft liquor stream and the flow cell connected to the kraft liquor stream. Relative to claims 23-24 examiner points out that there is

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no requirement that the stream always be undiluted nor is there structure in the claim to control the device to be undiluted or to prevent it from being diluted. The limitations are clearly process related. Any apparatus that is capable of diluting the liquid prior to analysis is fully capable of providing an undiluted stream for analysis by turning off the dilution fluid. As such the apparatus has not changed. It is also noted that the method claims do not have such a limitation. In the art combination used to reject the claims in which Danielsson is the primary reference, the analysis is for a kraft pulp liquid. In this rejection, Karlberg is showing the ability of simultaneous measurements of multiple compounds of the sample solution using the regression methods over the claimed range of frequencies. This is in contrast to the previous methods in which only individual concentrations were measured. In addition to this Ley is showing that there is an absorption critical to one of the components of a kraft pulp liquid that has a significant signal in the claimed range, the hydroxyl ion. Thus there is significant motivation to modify the teachings of Danielsson with those of Karlberg and Ley. Additionally since it is the Danielsson reference that is being modified, the Karlberg and Ley references do not have to anticipate the claims in order to be proper references. Thus the fact that Karlberg and Ley are not specifically directed to kraft pulp liquor fluids does not in and of itself make them uncombinable with Danielsson. And as discussed above there is sufficient motivation to incorporate teachings from Karlberg and Ley into Danielsson. The Doyle reference has reasons similar to those outlined previously for motivating one to use the tunnel ATR device in the Danielsson device and method. These include is a recognition of the problem that Doyle seeks to overcome – the lack of suitable ATR materials capable of using to measure a spectrum in a frequency range below 300 nm. When read in this manner, Doyle is clearly showing the advantages of making measurements in the ultraviolet range below 300 nm. This is clearly a motivation for the combination.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose current telephone number is (571) 272-1265 as a result of the examiner moving to the new USPTO location. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

A general phone number for the organization to which this application is assigned is (571) 272-1700. The fax phone number to file official papers for this application or proceeding is (703) 872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in cursive script, reading "Arlen Soderquist".

March 19, 2004

ARLEN SODERQUIST  
PRIMARY EXAMINER